

2013

Designing Online Strategy Instruction for Integrated Vocabulary Depth of Knowledge and Web-based Dictionary Skills

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Abstract

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Keywords

Strategy instruction, Instructional design, Learner dictionaries, Lexical patterns, Online learning, Vocabulary depth of knowledge

Disciplines

Bilingual, Multilingual, and Multicultural Education | Curriculum and Instruction | Educational Methods

Comments

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ABSTRACT

This paper describes the design and development of a CALL resource that teaches aspects of word combinability (i.e., grammatical collocation, transitivity, and complementation) to tertiary-level ESL learners by integrating conceptual understanding with related text-analysis and web-based dictionary skills. The resource delivers an automated, online form of strategy instruction outside of class time, facilitating self-paced learning with sufficient practice and feedback. In addition to the L2 lexicography, vocabulary, and strategy literatures, the project is informed by instructional design principles aimed at 1) managing demands on learners' cognitive processing capacities; 2) differentiating materials so as to appropriately target declarative or procedural forms of knowledge or the integration and coordination of the two; and 3) harnessing the computer's multimedia capabilities in principled ways. It seeks to address a number of related issues in second language studies including: the fact that pedagogical dictionaries go largely under-exploited and misused by their target audience; the apparent lack of understanding of collocational relationships among many L2 learners of English; the challenge of providing strategy instruction cost-effectively; and the need to facilitate more strategic and self-directed use of CALL resources.

KEYWORDS

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INTRODUCTION

Imagine a university instructor teaching an undergraduate ESL composition course. While grading the most recent homework assignment (a short research paper about a 20th century technological innovation), she comes across this sentence:

In the 1950s, American scientists warned people for the harm television could do to society.

The instructor must decide how to address the awkward lexical pattern *warn somebody for something*. Besides fixing the error herself or simply ignoring it, what options exist? This scenario will be used to illustrate a number of related problems in instruction in English as a second or foreign language (ESL/EFL) to which this paper proposes a unique solution.

First, the conventional use of an error code (e.g. "SVA" to indicate a problem with subject-verb agreement) would be unavailable in this case because, as noted by Ferris (1999, p. 6), lexical errors are "untreatable;" that is, there are no rules or general principles learners could be taught to facilitate self-correction. Yet not addressing such errors seems unreasonable given how common they appear to be. Chan (2010), for example, identified

comparatively high percentages of errors such as *The bus was crowded of people* and *They will not listen him* in her corpus of writing by secondary and tertiary ESL learners in Hong Kong.

Fortunately, help is available in the pedagogical dictionaries produced nowadays by major publishers in the field of English Language Teaching (ELT). Such references seek to provide ESL/EFL learners not only with comprehensive coverage of a word's meanings but also vocabulary depth-of-knowledge features (see discussion in Read, 2004) including morphological, syntactic, and derivational behavior, and collocational, stylistic, and register constraints—benefits generally not offered by dictionaries for other languages (Frankenberg-Garcia, 2011). Moreover, many ELT dictionaries are now freely available on the web where, for many purposes, they can be more quickly and conveniently consulted than the paper-based versions (Lew, 2011). Figure 1, for example, shows two entries for the verb *warn* in the online version of the *Longman Dictionary of Contemporary English* (LDOCE), along with their associated syntactic patterns in bold. The instructor in our scenario might therefore consider providing a link to this dictionary page in the margin alongside the original error.

Figure 1
Syntactic Patterns in the *Longman Dictionary of Contemporary English*



Recourse to dictionaries, however, is problematic. Many learners appear to lack mental models with which to differentiate among dictionary types (e.g., pedagogical versus those designed for native speakers) and the different purposes for which these are appropriate (Frankenberg-Garcia, 2011). Even advanced learners tend to prefer bilingual dictionaries and to focus on L1-L2 translation equivalents over other types of information (Atkins & Varantola, 1998; Frankenberg-Garcia, 2005), while use of monolingual dictionaries can be

impeded by L2 processing constraints (Neubach & Cohen, 1988; Tono, 2001). Learners have trouble distinguishing correctly among senses of polysemous words (Chan, 2011; Nesi & Haill, 2002) and tend to focus only on the initial or final entries (Nesi & Tan, 2011). They often ignore explicit usage information presented via symbols or codes and rely instead on examples for guidance (Bogaards & van der Kloot, 2002; Chan, 2012; Dziemianko, 2006), which can lead them astray when, for example, they use a word's semantic associations to deduce facts about its usage.

Difficulty in exploiting dictionaries must be partly attributed to the way they organize and present information (Dziemianko, 2006; Tono, 2011), but lexicographical research also shows that learners lack basic understanding of some vocabulary depth-of-knowledge features, thus undercutting the basis for consultation and exploitation. In a study involving 40 adult ESL learners in the UK, Nesi surmised that her participants had difficulty recognizing usage information in dictionary examples because "the concepts of transitivity and grammatical collocation were very poorly understood" (2000, p. 115). Chan (2012) drew similar conclusions about transitivity and complementation in her investigation of dictionary use among 31 advanced-level ESL learners at a Hong Kong university. Frankenberg-Garcia characterized the referencing strategies of the 211 Portuguese university students in her study as "disastrous" (2011, p. 119) with respect to prepositional collocations, noting the participants' apparent inability to distinguish between these and prepositions of time and place.

Studies of dictionary use usually conclude with calls for learner training, with many recent such calls also identifying a need for accompanying language-awareness raising regarding features of word combinability (Chan, 2011; Frankenberg-Garcia, 2011; Laufer, 2011). While L2 strategy instruction has been found to be generally effective in a recent meta-analysis (Plonsky, 2011), the study concluded that the observed effect sizes were not large enough to resolve lingering questions about cost-effectiveness. Conventional forms of strategy instruction require the commitment and training of teachers as well as the provision of already limited class time (Rubin, Chamot, Harris, & Anderson, 2007). In addition, established models of L2 strategy instruction (e.g., Chamot, Barnhardt, El-Dinary, & Robbins, 1999) may not be suited to the present problem insofar as it involves conceptual understanding of linguistic phenomena. The need to provide a sufficient quantity of relevant practice and timely, individualized feedback, which is important for skill acquisition (Carlson, 2003; DeKeyser, 2007), also poses challenges for teacher-led forms of strategy instruction.

Finally, the three aspects of L2 learning suggested in our hypothetical example—vocabulary depth of knowledge, dictionary skills, and strategy instruction—are all encountered by learners under conditions of limited cognitive processing capacity. Learning, not just of languages but in general, is constrained by the limitations of working memory, a fact that teachers and instructional designers should make a guiding principle of their work but which is too often overlooked (Sweller, van Merriënboer, & Paas, 1998). The implications are doubly important for L2 learning, which is mediated by forms that themselves consume additional processing capacity (Takeuchi, Ikeda & Mizumoto, 2012).

So what can be done to help our instructor, and more importantly, the learner who produced the original error mentioned in the introduction? First, the challenging features of word combinability discussed above—grammatical collocation, complementation, and transitivity—can be subsumed into a single, pedagogically friendly category using the system of linguistic description known as *pattern grammar*, developed by Hunston and colleagues (Hunston & Francis, 1998, 2000; Hunston, Francis, & Manning, 1997) as part of the COBUILD project. Pattern grammar¹ combines these features under the umbrella term *pattern* and emphasizes the systematic relationships between patterning and meaning. For example, when used with an *-ing* pattern, the verb remember can mean "to have a memory of something" (e.g., *I remember growing up in southern California*), but when used with a

to-infinitive it can mean “to not forget to do something” (e.g., *Remember to lock the door when you leave*). Many learners may be familiar with a small number of specific patterns such as these, but not as part of a wider linguistic category or concept, which presumably constrains not only the possibility of self-correction but also the chances that patterns may be acquired through noticing.

While pattern grammar posits that all word classes can be described in terms of patterning, Hunston and colleagues have focused their corpus research on the patterns of the more frequent verbs, nouns, and adjectives, and this research has informed the design of ELT dictionaries (as illustrated in Figure 1 above). Yet syllabi and teaching materials have been slow to incorporate patterns, perhaps because of confusion about how to address them. To be sure, the solution cannot lie in direct teaching of a large number of individual patterns. Besides being impractical in most instructional contexts, this would not empower L2 learners to deal with pattern grammar on their own. Rather, a generalized understanding of pattern grammar can be taught that connects the examples learners may already know and uses them in the formation of a metalinguistic concept or schema. At the same time, the instruction can provide text-analysis and referencing skills that will allow learners to identify new, unfamiliar patterns in input and research them efficiently in pedagogical dictionaries.

For ease of description and teaching, this combination of concepts and skills was given the name *strategic pattern knowledge* and made the goal of the instructional design project described in this paper. Strategic pattern knowledge might not only allow learners to self-correct pattern-based errors pointed out by a composition teacher, but also to deal with this lexical phenomenon more independently in other aspects of learning. Importantly, it might go some way toward addressing an insensitivity to collocational relationships that has been cited as a possible reason for L2 learners’ limited knowledge of formulaic sequences (Flowerdew, 2006; Granger, 1998; Wray, 2002). It might also prove an important complement to the item-focused teaching of depth-of-knowledge features advocated by some experts on L2 vocabulary pedagogy (Laufer, 2010; Lewis, 1997; Nation, 2007).

Furthermore, this skills-based form of lexical knowledge can be taught using automated online instructional materials. As outlined in Ranalli (2009), this can reduce the burden that strategy instruction imposes on teachers and timetables. It would also allow strategy instruction to share in the benefits of CALL already enjoyed in other areas of L2 pedagogy, including convenient access, cost efficiency, easier distribution and recycling of materials, situated learning, the use of multimedia, immediate and individualized feedback, and learner empowerment (Reinders & White, 2010). Online instruction also provides unique affordances to tertiary-level ESL composition teaching, which is the context of this project. As noted by Warschauer (2007), the online space is where our students do much of their work, and it has changed not only writing instruction but writing itself. For example, the web provides student writers with convenient access to powerful instructional aids including, as already noted, learner dictionaries. Finally, online instruction makes it possible to conduct non-intrusive forms of research concurrently with instruction through the collection of performance and interaction data, which can facilitate evaluation and research.

To achieve these goals, it will be useful to conceptualize strategic pattern knowledge as a *complex cognitive skill*; that is, a skill made up of both declarative and procedural forms of knowledge that must be integrated and coordinated for successful operation of the whole (van Merriënboer, 1997). This will help to distinguish the instructional strategies needed to develop the different constituent types of knowledge and skill, and these strategies can then be implemented using forms of presentation and tasks that are appropriate to online learning and which take account of L2 learners’ more limited cognitive processing capacities.

The project has therefore employed concepts and methods from the field of instructional design in the development of a prototype online course, which is described below. To distinguish the unique characteristics of the resource from the design principles it exemplifies (since both are presented as innovations), the paper will be structured using the three-part hierarchy for analyzing approaches to L2 instruction proposed by Richards and Rodgers (2001), which has served as the basis for other methodological frameworks in CALL (Hampel, 2006; Hubbard, 1992, 1996). Here, *approach* will refer to the theories and concepts that guided the project. The subsequent section on *design* will describe the methods and tools used to 1) decompose strategic pattern knowledge into its constituents, 2) set objectives for the instruction, and 3) iteratively create, test and refine the materials. The third section, called *procedures*, will provide representative samples of the materials along with commentary on how they demonstrate the principles outlined at the beginning. The paper will conclude by discussing implications and next steps for the project.

APPROACH

As is the case with some influential theories of L2 learning strategies (O'Malley & Chamot, 1990) and models for L2 strategy instruction (Chamot et al., 1999), the current project is situated in cognitive theory, which views learning as "an active, constructivist process in which learners select and organize informational input, relate it to prior knowledge, retain what is considered important, use the information appropriately, and reflect on the outcomes of their learning efforts" (Chamot, Barnhardt, El-Dinary, & Robbins, 1996, p. 176). There are, however, some key distinctions and changes of emphasis. In their seminal book, O'Malley and Chamot (1990) also describe learning strategies as complex cognitive skills but view these as consisting solely of procedural knowledge once all their constituents have become automatized. In the present conceptualization, some declarative and procedural forms of knowledge must by necessity remain separate (as explained below) but must also be efficiently integrated and coordinated. Thus, the main task of instructional design will be to appropriately target the different components and orchestrate them in a context of limited processing capacity. Three main theoretical orientations, which are roughly contemporary with each other, provided guidance in this regard. Each is now briefly summarized and its relevant principles are then outlined and exemplified with reference to the current objectives.

Cognitive Load Theory

Of great relevance to this project and to L2 instruction more generally is cognitive load theory (Sweller et al., 1998; van Merriënboer & Sweller, 2005), which focuses on the limitations inherent in cognitive processing. Based on a generally accepted two-part division of cognitive architecture into working memory (WM) and long-term memory (LTM), the theory states that only about seven items can be held in WM at any one time, and if these items interact, the number is lower because interaction requires processing. There are apparently no limits to LTM, but its content is only available for processing when activated in WM. The phenomenon of chunking allows WM capacity to increase by subsuming otherwise disparate factual and episodic knowledge into containers called schemata. Schemata also expand the capacity of WM because they can be organized hierarchically and embedded within each other (Gagné, Yekovich, & Yekovich, 1993). In addition to declarative knowledge, schemata can also include procedural knowledge that, when performed, requires more or less conscious control (and thus processing capacity) depending on the degree to which it has been automatized. According to cognitive load theory, therefore, an important goal of instruction should be to develop learners' domain-appropriate schemata through both concept formation and rule automation to help ease processing constraints during learning.

Cognitive load is the amount of processing capacity required by a particular learning task. Sweller et al. (1998) identify three types. *Intrinsic* cognitive load is the amount inherent in

the task; it cannot be altered by manipulating instruction. *Germane* cognitive load is when processing capacity is devoted to schema construction or rule automation; in other words, to learning. (Germane cognitive load is thus the goal and the “sweet spot” of instructional design.) The third type, *extraneous* cognitive load, is generated when instructional materials require processing that contributes neither to schema construction nor rule automation.

Imagine the instructor in our scenario directing the author of the error to correct it by consulting the word *warn* in a learner dictionary. A certain amount of processing will be required to hold the objective in WM while performing the search (*intrinsic cognitive load*). If the learner lacks schemata for both pattern grammar and learner dictionary entries, he will have insufficient knowledge with which to efficiently categorize the error and organize the information in the dictionary. As a result, he is likely to resort to means-end analysis, a problem-solving strategy characteristic of novices in which solutions are tested randomly, one after another, placing increasing demands on WM (*extraneous cognitive load*). Alternatively, if he has well-developed schemata for the task, the dictionary information can be conceptually ordered and exploited with reference to the error in an efficient way, with some surplus processing capacity perhaps devoted to remembering the particular pattern used in the correction (*germane cognitive load*).

The pedagogical consequences of schemata being composed of both declarative and procedural knowledge are taken up next.

The 4C/ID Model

The Four Component Instructional Design (4C/ID) Model is, as the name suggests, a framework for instructional design, but it includes theoretical insights regarding the need for multidimensional forms of training to address the different components of complex cognitive skills. The model was developed by van Merriënboer (van Merriënboer, 1997; Van Merriënboer, Clark, & De Croock, 2002) for training in modern technical job skills, such as air traffic control and computer programming. Such skills are distinguished from industrial-age job skills insofar as they require schema-based understanding of complex systems and advanced problem-solving abilities in addition to psychomotor and lower-order cognitive skills. The rationale for applying this framework to the domain of L2 learning strategies is that, to the extent that a particular strategy requires analyzed knowledge of the L2 (Abraham & Vann, 1996; Bialystok & Ryan, 1985), it will involve conscious processing of a complex system (McLaughlin, Rossman, & McLeod, 1983).

The 4C/ID framework differentiates between forms of knowledge representation by decomposing complex cognitive skills into their constituents, which are then categorized as either *recurrent skills* or *non-recurrent skills*. Recurrent skills, based in procedural knowledge, are used for those aspects of a task that are the same from situation to situation. With enough practice, they can become highly automatic such that they require little conscious control. Non-recurrent skills, based in declarative knowledge, can be thought of as “novel” because they allow one to address the unique aspects of a particular task, and “effortful” insofar as they require conscious control (van Merriënboer et al., 2002, p. 42). In addition to task definition, non-recurrent skills also facilitate monitoring and evaluation of performance. The major differences between recurrent and non-recurrent skills are summarized in Table 1.

Table 1

Comparison of Recurrent and Non-recurrent Constituent Skills, Following van Merriënboer (1997)

	Recurrent skills	Non-recurrent skills
Type of knowledge	Procedural	Declarative
General characteristics	Fast and accurate, but inflexible	Flexible, but slow and error prone
Type of processing	Automatic	Controlled
Contribution to the whole skill	Free up cognitive resources that can be devoted to non-recurrent skill operation by reducing cognitive load	Allow application of the whole skill to new tasks and situations by facilitating task definition as well as monitoring and evaluation of performance

The key to performance of a complex cognitive skill is the successful orchestration of its constituents. For example, our hypothetical composition student may have a well-developed schema that helps him identify potential pattern-grammar errors in text, and another schema that facilitates efficient searching of learner dictionaries, but by themselves these do not constitute strategic pattern knowledge. His schemata must be integrated and coordinated so that 1) pattern identification leads to effective dictionary searches, and 2) dictionary data is interpreted accurately with reference to the original context of use.

The four components in the title of the model constitute the four main elements of instruction:

Just-in-time information

Just-in-time information is presented immediately before, or at the same time as, learners are expected to perform a task aimed at developing recurrent skills. The temporal contiguity limits the demands on working memory and allows the declarative representation of the procedure to be transformed into a procedural program, which in skill acquisition terms is called *compilation* or *rule automation*.

Supportive information

This information helps learners develop schemata in long-term memory. Supportive information may represent a conceptual model of a system or steps in a cognitive strategy for addressing a particular type of problem. To reduce cognitive load, supportive information is not presented while learners are performing a task but before, so that the resulting schema stored in long-term memory can be activated in working memory during performance.

Part-task practice

In part-task practice, constituents of the whole skill are practiced piecemeal, supported by the activation of relevant schemata or the presentation of just-in-time information. Part-task practice targeting recurrent skills focuses on compilation and strengthening of procedural knowledge, while practice targeting non-recurrent skills focuses on schema construction through *induction* (mindfully abstracting away from particulars to form a general concept) and *elaboration* (incorporating new information into existing knowledge).

Learning tasks

These are practice activities focusing on the whole-task or approximations of the whole-task that give learners a chance to develop automaticity in integrating and coordinating the various constituent skills of which a complex cognitive skill is composed.

Not only is the content of just-in-time and supportive information important but also the manner of presentation, which is the rationale for the third theoretical orientation of this project.

Multimedia Learning Theory

Multimedia Learning Theory (Mayer, 2002; Mayer & Sims, 1994), which has featured in contemporary L2 studies involving hypermedia annotation (Chun & Plass, 1996; Plass, Chun, Mayer, & Leutner, 1998), proposes that mental representations built on input from both visual and verbal/auditory sources of information lead to better learning than those built on information from either source alone. The theory is based on models of human memory (Baddeley, 1990) and cognition (Paivio, 1991) that postulate separate channels for visual and verbal information. Verbal information can be written or spoken, while visual information can be a static printed image or a dynamic animation or video. Learners actively select, organize, and integrate information from both channels to create coherent knowledge representations. A number of empirical studies have shown that multimedia presentations result in knowledge that is better retained and transferred, which Mayer characterizes as “meaningful learning” (2002, p. 101).

However, the amount of information that can be processed in either channel is limited. Mayer and associates have drawn on cognitive load theory in proposing a number of principles for instructional design. Those relevant to the current project are the following.

Spatial contiguity

Fewer demands are made on working memory when verbal and visual information are integrated, rather than separated, in presentation.

Coherence

Verbal information, images and sounds are instructive to the degree that they are relevant and explanatory. Interesting but unrelated text, background music or decorative designs may impede learning if they divert processing away from the selection, organization or integration of information.

Modality

In the case of animation, related verbal information presented as on-screen text requires the visual channel to process two forms of incoming information, leading to possible overload. If the animation is accompanied by the same verbal information as spoken narration, the load can be distributed between the two channels.

Redundancy

Presentation of the same information via two channels or modes, such as verbal information presented via narration and on-screen text, can divert processing capacity by prompting searches for differences to reconcile. Presentations should therefore aim for complementarity and avoid redundancy. (This had to be balanced against the need for L2 comprehension support, as described below.)

Signaling

Certain information can be highlighted in presentation to guide learners in selecting and organizing, either because that information is important or shows how other information is related.

Personalization

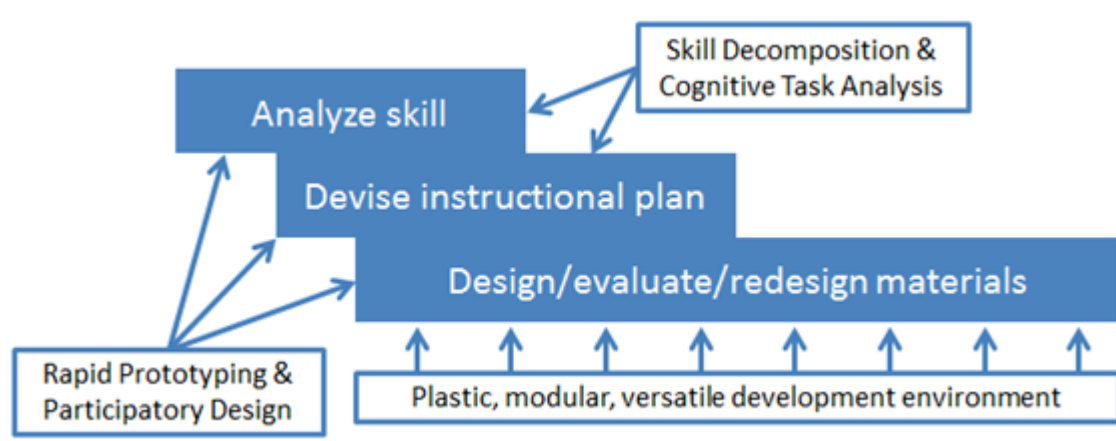
An informal, conversational style in presenting verbal/auditory information is preferable to a detached, formal style because the former can activate a conversation schema and accompanying conversational maxims (Grice, 1975). Thus a learner may attend to narration with greater commitment than if the speaker was perceived as less of an interlocutor.

With these instructional design principles guiding the project, the next step was to operationalize strategic pattern knowledge, elaborate its constituents, and identify forms of presentation and tasks that could be used to teach it.

DESIGN

The current project was both propelled and burdened by a number of innovative elements, including the adaptation of a model for technical skills training to L2 pedagogic purposes and the goal of an automated, online form of strategy instruction. As a result, a great deal of information necessary for all stages of the design was unknown at the beginning, making a linear approach impossible. Instead, as illustrated in Figure 2, the three main design processes overlapped in time in an iterative and recursive way, with work done in one process often being revised on the basis of products from another. To address these challenges, the project borrowed a number of methods and tools from the field of instructional design, which are described below.

Figure 2
Design Processes and Inputs



Note: Design processes are shown in filled rectangles extending and overlapping in time. Non-time bound methodological and technological inputs, which informed or facilitated the design processes, are shown in unfilled rectangles.

The first process was analyzing the skill of strategic pattern knowledge to identify its components that would require instruction. To do so, principles and techniques were adopted from skill decomposition (van Merriënboer, 1997), an initial design procedure that breaks complex cognitive skills into their constituents and categorizes them as recurrent or non-recurrent. This was accomplished in a number of ways, for example, by reviewing related research and published instructional materials, and by introspection on the part of the author during performance. The process was also informed by cognitive task analysis

(Clark, Feldon, van Merriënboer, & Yates, 2008), which uses techniques such as thinkaloud and observation to uncover implicit or underlying schematic forms of knowledge that may be required for performance. The skill-analysis process revealed, for instance, that efficient use of online dictionaries can be impeded if learners lack the ability to use shortcut keys for copy-and-paste and navigation between application windows. It also established the need to make patterns more relevant by contextualizing them within a superordinate schema for vocabulary depth-of-knowledge features.

The thinkalouds and observations were conducted as part of rapid prototyping, which is an instructional design approach adapted from the field of software design. Rapid prototyping involves early and frequent tests of models of instructional materials with potential learners, the goal being to identify problems and refine objectives before making large investments of time, effort, or funding (Tripp & Bichelmeyer, 1990). Rapid prototyping is suited for projects in which instructional goals are complex and novel, and when the designer is experienced enough to respond intuitively and creatively to issues arising during frequent usability tests.

These tests proved helpful not only for skill analysis but for instructional planning and materials design. They were conducted with the help of students at Iowa State University's Intensive English and Orientation Program, where the author worked as coordinator of the Language Learning Center. Higher-level students whose vocabulary knowledge approximated that of the eventual target users were identified and encouraged to participate in usability sessions as an alternative form of self-access learning. This also facilitated participatory design (Willis & Wright, 2000), which involves stakeholders in the design process to ensure the eventual product meets their needs.

On the basis of the skill-analysis process, the following objectives were set for the project: to instruct learners in a basic form of strategic pattern knowledge such that, at the end of training, they would be able to 1) identify potential patterns in given sentences; 2) reference them in a learner dictionary to determine whether they are used appropriately; and if not 3) use dictionary data to make suitable corrections. An acknowledged limitation is that these objectives do not include transfer of the skill to learners' own writing. Transfer is a challenge for any instructional intervention (Salomon & Perkins, 1989) and one that the project will address later if the basic concept is proved feasible (see conclusion).

Further skill analysis and prototyping allowed elaboration of the objectives into an instructional plan (Table 2) addressing three schemata that form the basis of strategic pattern knowledge. For each schema, the recurrent and non-recurrent skills that require training are listed, as well as the supportive and just-in-time information needed to develop those skills. "Word patterns" are the focus of the third schema; the first two, related to "Deep vocabulary knowledge" and dictionaries, are prerequisites.

Table 2
Instructional Plan Showing Targeted Schemata

Schema	Recurrent skills	Non-recurrent skills	Supportive information	Just-in-time information
Deep vocabulary knowledge	None	<ul style="list-style-type: none"> Identifying DVK features Categorizing common vocabulary errors according to the DVK feature they represent Locating DVK features in a variety of learner dictionaries 	<ul style="list-style-type: none"> A variety of DVK features exist. DVK features are important for contextually appropriate use of vocabulary. DVK features are best consulted in learner dictionaries. 	None

Dictionaries	<ul style="list-style-type: none"> • Navigating quickly between windows using shortcut keys and mouse • Copying and pasting quickly using shortcut keys and mouse • Searching keywords using web browser's "Find" function • Using the "Menu" tool in the LDOCE 	<ul style="list-style-type: none"> • Selecting an appropriate dictionary for one's purpose • Identifying appropriate entry/definition to match sense of word in given context • Negotiating long dictionary entries with numerous senses 	<ul style="list-style-type: none"> • Choice of dictionary type depends on one's purpose. • Monolingual learner dictionaries are best for encoding purposes. • Cognitive strategy for identifying appropriate sense of a polysemous word among numerous entries 	<ul style="list-style-type: none"> • Visual demonstration of window navigation using shortcut keys and mouse • Copy-and-paste using shortcut keys and mouse • Keyword search using web browser's "Find" function • Use of the "Menu" tool in the LDOCE
Word patterns	<ul style="list-style-type: none"> • Further practice with navigating quickly between windows using shortcut keys and mouse • Copying and pasting quickly using shortcut keys and mouse • Searching keywords using web browser's "Find" function • Using the "Menu" tool in the LDOCE 	<ul style="list-style-type: none"> • Identifying WPs in sentences and texts • Referencing WPs in learner dictionary to check whether use is appropriate • Using pattern information to identify appropriate sense of a word • Using example sentences to distinguish between senses and patterns • Identifying appropriate pattern for given context • Using dictionary information to correct WP errors 	<ul style="list-style-type: none"> • WPs are common in English with verbs, nouns and adjectives. • A wide variety of WP types exist. • WPs help distinguish among the senses of different meanings of frequent words. • WPs are important for accuracy and fluency. • Words with similar meanings often share a WP. • WPs can structure long stretches of text and span intervening words. • It is helpful just to notice WPs in texts or dictionary entries. Memorization is not necessary. 	<ul style="list-style-type: none"> • Visual demonstration of whole-task practice exercise using constituent skills in combination

Note: DVK=deep vocabulary knowledge, WP=word pattern, LDOCE=online version of the Longman Dictionary of Contemporary English.

The next process involved the design of 1) online tasks to train the recurrent and non-recurrent skills and 2) multimedia presentations to convey the supportive and just-in-time information. This was facilitated by the choice of development environment, which had to fulfill rather demanding criteria. In order to support the overlapping design processes, the authoring tools had to be both plastic (i.e., components can be modified quickly and easily) and modular (i.e., one component of an instructional unit can be changed without adversely affecting other components) (Tripp & Bichelmeyer, 1990). In addition, they had to be versatile enough to address the project's content-related goals while accommodating its instructional design principles. For example, the authoring tools had to be able to:

- integrate text, images, audio, and video in principled ways and in conjunction with an adequate variety of text-based activity types;
- provide feedback on users' performance while collecting information about their interaction with the materials;
- facilitate ways of accessing an online learner dictionary that were initially scaffolded but later authentic; and

- allow different conditions of access to the materials based on stage of learning and previous performance.

Initially, the author experimented with Flash-based authoring tools, such as Adobe Captivate and Rapid Intake ProForm, but these performed poorly on many of the above criteria. For instance, they offered only a limited number of text-based activity types, which were also difficult to integrate with audio and video. The need for the materials to include a large number of elements meant the project files quickly became very large, which slowed prototyping considerably. The resulting Flash objects were themselves very large, taking a long time to load in users' web browsers and putting those with slower Internet connections at a significant disadvantage. In addition, incompatibilities in the implementation of SCORM standards meant scores and interaction data often failed to transfer to the learning management system.

After much additional experimentation and research, a mix of technologies was selected. These are described in relation to the role they fulfilled.

Presentations

PowerPoint slideshows were the basis of many of the presentations. The slides consisted of text and images (e.g., clipart, Creative Commons-licensed photos, and computer screenshots) arranged in accordance with the modality principle. Simple animation effects were achieved through the use of slide transitions. The slide presentations were video-recorded with Camtasia Studio, which was also used to capture onscreen demonstrations of the recurrent skills. Off-screen behaviors, such as the use of keyboard shortcuts, were filmed with a pocket video camera.

Camtasia Studio was also used for post-production. The video footage was integrated with spoken narration that had been recorded and edited in Audacity, the open-source audio software program. The narration was based on scripts that were specially written in accordance with the coherence and personalization principles (Mayer, 2002). These scripts were also the basis for optional captions that learners could use, if needed, for comprehension, but which could also be turned off to avoid the redundancy effect.

Tasks

Tasks were created with Hot Potatoes, an authoring suite for web-based materials based in HTML and Javascript. Although it is no longer being supported by its developers at the University of Victoria, it remains popular among language instructors for the wide variety of text-based activities that can be created from a basic palette of question types: multiple choice, short answer, cloze, matching, ordering, and crossword puzzle. Its versatility arises from the fact that reading texts, images, audio, and video can be integrated into activities easily and in a variety of ways. The activities themselves are easy to create and modify and require no scripting skills.

Delivery and administration

Moodle was the main delivery mechanism. This is an open-source learning management system that includes tools for controlling access to materials, facilitating communication with and among learners, conducting assessments, managing grades, and tracking activity. It also allows selective assignment of tasks to specified subgroups of learners, which can facilitate research.

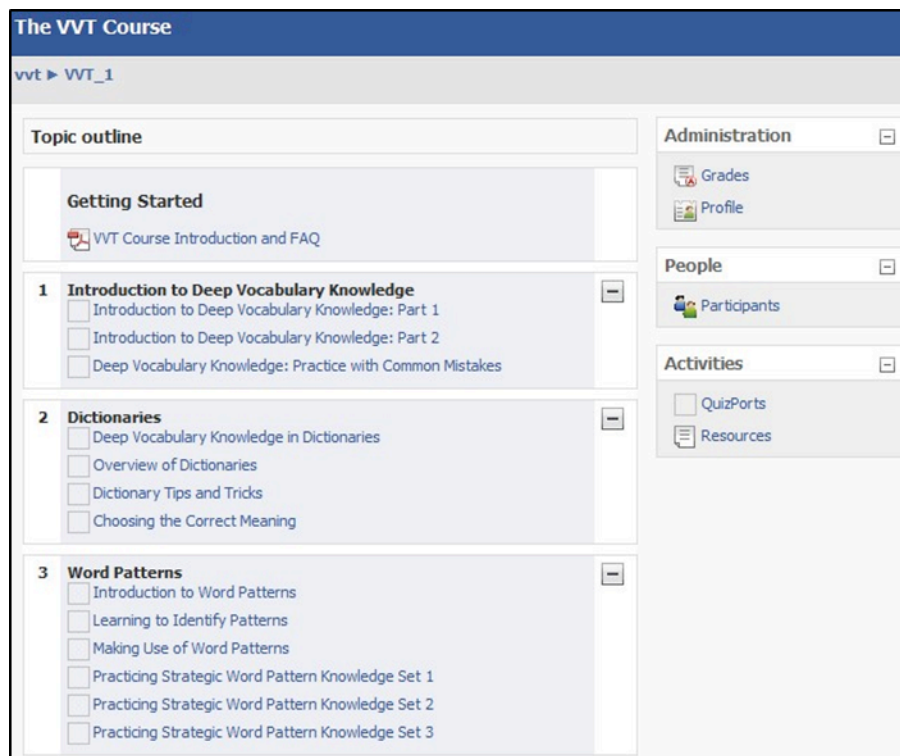
In addition, the project relied heavily on QuizPort, a third-party module for Moodle that allows a designer to 1) link Hot Potatoes exercises and other HTML pages into chains or groups, 2) add functionality, and 3) gather data on users' performance and interactions,

thus achieving the hybridization of client- and server-side CALL technologies described by Levy and Stockwell (2006). QuizPort was used to combine related presentations and tasks into tutorials, which became the main unit of instruction. The tutorials make use of a conditional access feature in QuizPort to create adaptive instructional experiences. Learners first make their way through a tutorial in a set, linear sequence, but when a threshold score is achieved, they are given unrestricted access to a menu of all the presentations and tasks. While this diversity of tools took some time for the author to master, it proved to be modular, plastic, and versatile enough to support the goals of the project. The materials that resulted, and the way these embody the instructional design principles, are described next.

PROCEDURES

The instructional principles and procedures take shape in a prototype course called VVT (Virtual Vocabulary Trainer) consisting of 10 tutorials and three whole-task practice sequences. For illustration purposes, the tutorials will be described in relation to the schema they target, as shown in Figure 3. In practice, however, the learning management system is used to distribute the instruction over a period of four to eight weeks, depending on how it is incorporated into a particular course.

Figure 3
VVT Homepage Showing Tutorials Categorized under Three Targeted Schemata



Because of the cumulative nature of the skills and knowledge addressed, the sequence of the tutorials is fixed. The mastery score for any tutorial is 80 percent; learners who score less than this must retake the tutorial to get full credit. Eighty percent is also the cutoff point for allowing open access to the presentations and tasks that make up each tutorial (as shown in Figure 4). The estimated time needed to complete a tutorial ranges from 20-50 minutes, excluding retakes. In total, the VVT course takes most students 8-10 hours to complete.

Figure 4
Conditional Access to VVT Materials

Introduction to Word Patterns

This tutorial consists of ...

- 2 short videos (total viewing time about 4 minutes)
- 6 matching exercises
- 7 jumbled sentence exercises

Estimated time to complete: **30-40 minutes.**

Start new unit attempt

VVT_1

Introduction to Word Patterns

Please choose one of the following:

- Intro (1:52)
- connecting adjectives
- identifying adjective patterns
- connecting nouns
- identifying noun patterns
- connecting verbs
- identifying verb patterns
- Why are word patterns important? (2:12)
- urge
- doubtful
- waste
- strategy
- equip
- busy
- label

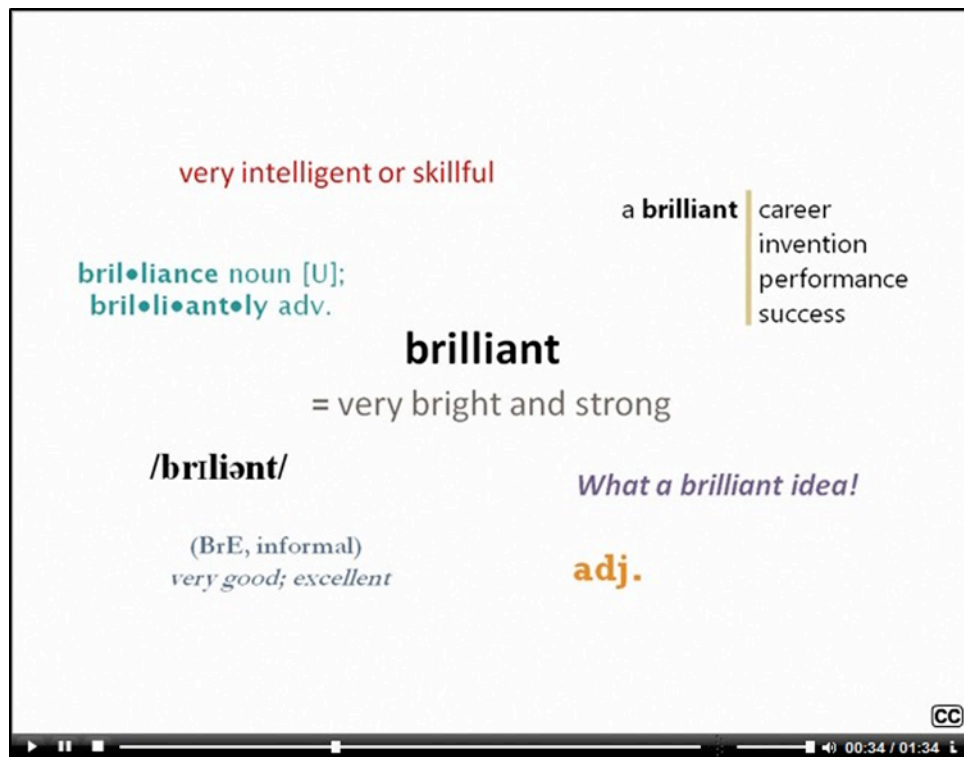
Note: Left, the entry page learners see on their first attempt of a tutorial; right, the open-access menu of presentations and tasks visible after the tutorial has been completed with a score of 80 percent or higher

Deep Vocabulary Knowledge

These tutorials aim at the development of a schema for “deep vocabulary knowledge” (DVK), which refers to a collection of lexical knowledge types that are distinguished from basic vocabulary knowledge (i.e., form-meaning associations), the type on which learners typically focus. The video shown in Figure 5 aims at the elaboration of learners’ pre-existing knowledge to develop such a schema. Various forms of lexical knowledge (spoken and written form, collocation,² part of speech, register, etc.), some of which will already be familiar, are conceptually and spatially associated with each other while the accompanying narration identifies them as features that “students need to know in order to use words accurately and appropriately.” The CC button in the lower right-hand corner is used to toggle the optional captions, which are provided for learners who need comprehension support, but which can remain hidden so as not to require additional processing. Like all presentations in the course, this one is less than three minutes long, an intentional design feature to embody the coherence principle.

Figure 5

Presentation Aimed at the Elaboration of a Schema for “Deep Vocabulary Knowledge” ([click to view sample online](#))



The introductory tutorials in this section focus on establishing learners' basic understanding of 10 aspects of deep vocabulary knowledge, including word patterns. Later, exercises such as that shown in Figure 6 aim at further refining the overall schema through induction. Learners are presented with examples of errors involving deep vocabulary knowledge and asked to identify the specific DVK feature that each represents. To manage processing demands, relevant images are provided, which support comprehension so that attention can be directed to form. Also, these tasks are limited to error identification and classification; learners are not required to attempt corrections at this stage, which would likely result in cognitive overload and subvert the instructional purpose. After each set of identification/classification tasks, a presentation encourages learners to mindfully abstract from the particular example to the wider implications for learning and use of that particular DVK feature.

Figure 6

Error Classification Task to Elaborate a DVK Schema ([click to view sample online](#))

WHAT TYPE OF MISTAKE IS THIS?

She recommended me that new restaurant.



A. ☐ Part of Speech

B. ☐ Word Patterns

C. ☐ Word Families and Derivatives

D. ☐ Additional Meanings

Dictionaries

The next tutorials in the sequence deal with dictionaries. The first reviews the 10 aspects of DVK and gives learners simple practice in identifying these in a variety of formats used in different learner dictionaries. The second aims at elaboration of learners' existing schema for dictionaries by making key distinctions between corpus-based dictionaries for L2 learners of English, bilingual dictionaries, and dictionaries designed for native-speakers. The presentations provide examples of appropriate applications of the different types (e.g. *Bilingual dictionaries are more suitable for decoding and monolingual learner dictionaries for encoding*) and highlight differences in the kinds of information each provide, as shown in Figure 7.

Figure 7

Presentation Aimed at Building a Schema for Dictionary Types ([click to view sample online](#))

Native speaker dictionary		Learner's dictionary
×	Collocation	✓
×	Word Patterns	✓
×	Register	✓
×	Frequency	✓

ap·point·ment (ə-poin'tmənt) *n.* *Abbr.* **appt.**

1.a. The act of appointing or designating for an office or position. **b.** The office or position to which one has been appointed. **2.** An arrangement to do something or meet someone at a particular time and place. See Synonyms at **engagement**. **3. appointments.** Furnishings, fittings, or equipment. **4. Law.** The act of directing the disposition of property by virtue of a power granted for this purpose.

American Heritage Dictionary 1994

ap·point·ment /ə'pointmənt/ *noun* ★★★

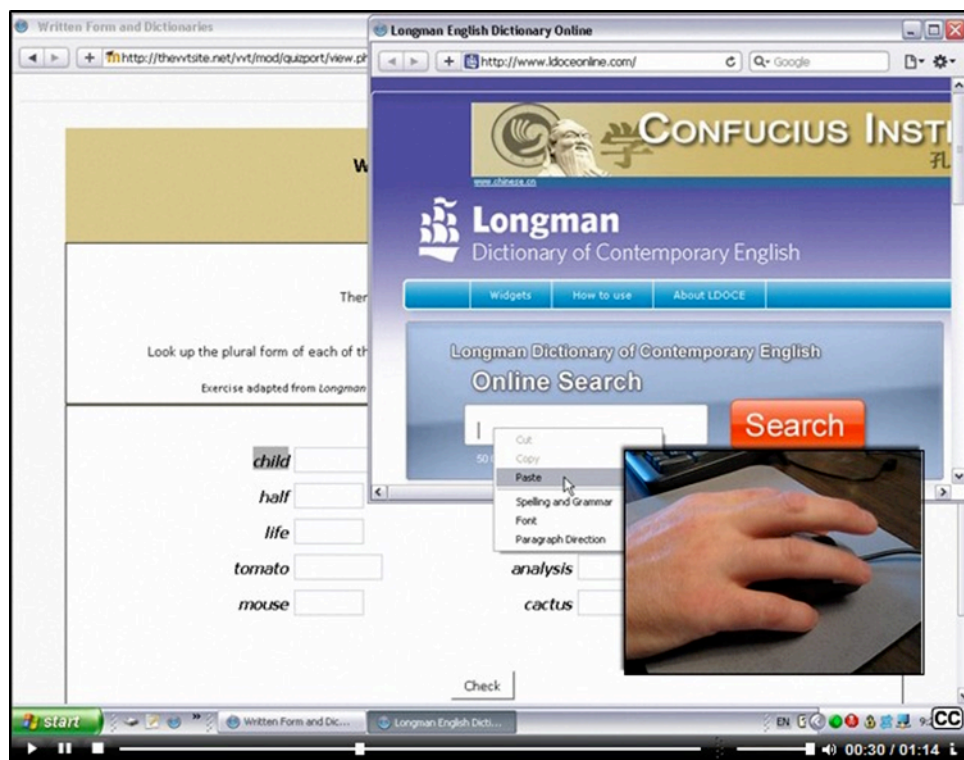
1 [C] an arrangement to see someone at a particular time, especially for a business meeting or to get a professional service: **make an appointment** *Sue called to make a dental appointment.* • **+with** *I'd like to make an appointment with the doctor.* • **appointment to do sth** *I have an appointment to see my lawyer next Saturday.* • **keep an appointment** (=go to an appointment that you have arranged) *Please notify us if you are unable to keep your appointment.* • **by appointment** (=at a time already arranged) *Viewing of the property is by appointment only.*

2 [C/U] the fact of being given a new job, especially an important one: **+as/to** *his appointment as governor of California* *to the governorship of California* **2a.** [C] a job, especially an important job: *Her first academic appointment was as an assistant professor at Yale.* • *Internal appointments are advertised on the bulletin board.*

Macmillan English Dictionary 2002

Recurrent skills are also addressed in a tutorial called "Dictionary Tips and Tricks," which develops learners' abilities to consult an online learner dictionary quickly and efficiently. Three subskills are targeted: 1) fast navigation between the source document and dictionary window using shortcut keys; 2) copying and pasting target items from a source document into a dictionary search box using the mouse or shortcut keys; and 3) conducting keyword searches in lengthy dictionary entries using a browser's "Find" function. Just-in-time information is used to model each technique, as shown in Figure 8. Learners watch the skills being performed and then practice themselves, first in untimed conditions to support compilation, then in timed conditions to promote strengthening. These skills are further reinforced in later tutorials by reminders to use them whenever an exercise entails online dictionary use. Cognitive load is further managed by encouraging learners to situate source and dictionary windows for simultaneous viewing, if screen size allows.

Figure 8
Presentation Modeling Copy/Paste with Right Mouse Button ([click to view sample online](#))



The non-recurrent skill of finding the appropriate sense of a word in a dictionary entry is also covered. This is crucial as the more frequent and useful words of the language are generally polysemous, and searching a large number of senses can be costly in processing terms. Cognitive load is managed in a number of ways. First, learners are reminded to use the subskills for fast, efficient dictionary searches covered in the previous tutorial. Second, practice activities are developmentally sequenced, with easier tasks first, as shown in Figure 9, in which the possibilities are narrowed to two numbered definitions. Then, in later tasks involving long entries with multiple senses, learners are shown how to use their web browser's "Find" function, as well as a unique contextual "Menu" feature in the LDOCE, for keyword searches.

Figure 9

Task Aimed at Identifying the Appropriate Sense of Polysemous Words ([click to view sample online](#))

Choosing the Correct Meaning

Finding the Correct Entry and Definition 1

Use this link to open up the online dictionary window.

Longman
Dictionary of Contemporary English

Exercise adapted from Longman Dictionary of American English Workbook by Marjorie Fuchs, © Longman 1992

1 / 5 => [Show all questions](#)

Driving along the highway, she was suddenly blinded by the **beam** of an approaching car.

A. ? 1 beam

B. ? 3 beam

beam ¹ noun

Related topics: [Other Sports](#), [Physics](#), [Construction](#), [Power](#), [Water](#)

beam [countable]

- 1 a) a line of light shining from the sun, a lamp etc:
the beam of a powerful flashlight
b) a line of light, energy etc that you cannot see:
a laser beam
- 2 a long heavy piece of wood or metal used in building houses, bridges etc
- 3 a wide happy smile:
a beam of delight
- 4 **off beam** *British English informal* incorrect or mistaken:
Our guesses were way off beam.
- 5 a **BALANCE BEAM**
- 6 **technical** the widest part of a ship from side to side

→ [broad in the beam](#) at [BROWN](#) (1)

Word patterns

With the groundwork having been laid, the final set of tutorials takes up word patterns as the main focus. They are again contextualized as a component of DVK. Patterns that may already be familiar to learners, such as those that accompany the verb *suggest*, are made the starting point for the construction of a larger, more detailed schema for word patterns. Presentations in this section provide supportive information such as the fact that there is a wide variety of patterns in English, and they attach not only to verbs but also to nouns and adjectives (see Figure 10). They also aim at the elaboration of a mental model of learner dictionary entries in which word-pattern information is integrated into the information for different senses of a word, as shown in Figure 11 (which also demonstrates the use of signaling). A mental model can reduce cognitive load by helping learners order dictionary information into meaningful categories that can be selectively attended to depending on the particular search.

Figure 10
Presentation Aimed at Elaborating a Schema for Word Patterns ([click to view sample online](#))

PATTERNS WITH CAPACITY

- capacity + *of*
- capacity + *for*
- capacity + *to*-infinitive

PATTERNS WITH SUGGEST

- suggest + *that* clause
- suggest + *-ing*
- suggest + noun phrase

PATTERNS WITH OBVIOUS

- it + is + obvious + *that* clause
- obvious + *to*
- the* + obvious + *thing* + *to*-infinitive

CC

Figure 11
Presentation Aimed at Creating a Mental Model of LDOCE Entries ([click to view sample online](#))

contact *noun*

NEWS See related topics: ELECTRICITY, ELECTRICAL, ELECTRICITY

con-tact

1 **COMMUNICATION** [uncountable] communication with a person, organization, country etc.

- contact with/between
- There is very little contact between the two tribes.
- Few people have daily contact with mentally disabled people.
- be/get/stay/keep in contact (with somebody)
- We stay in contact by email.
- We'd like to make contact with other schools in the area.
- The children lost contact with their families (=they no longer see them because they do not know where to find them).
- the ship's failure to make radio contact
- She put me in contact with an expert in the field (=she gave me their name, telephone number etc).
- face-to-face/social/personal contact (talking to someone who is with you)
- There is little personal contact with customers.
- staff who have direct contact with the patient
- The town is cut off from contact with the outside world.

2 **TOUCH** [uncountable] when two people or things touch each other

- contact with/between
- Children need physical contact with a caring adult.
- The disease spreads by sexual contact between infected animals.
- in contact with something
- For a second, his hand was in contact with mine.
- When water comes into contact with air, carbon dioxide is released.
- on contact (with something)
- The bomb exploded on contact (=at the moment it touched something).

3 **EXPERIENCE** [uncountable] when you meet someone or experience a particular kind of thing

- Everyone who came into contact with Ds felt better for knowing her.
- Pat's job brings her into contact with the problems people face when they retire.

The pattern can be a clue to the specific meaning.

CC

Note: signaling shows how word-pattern information is integrated into entries for different senses

This mental model is then further developed by way of dictionary exploitation exercises such as that shown in Figure 12, which is one of several part-task activities addressing the subskills of strategic pattern knowledge. In this exercise, a sentence with a gap or gaps representing a word pattern is provided alongside the LDOCE entry for the word. At this point, neither dictionary searches nor pattern identification are involved to reduce cognitive load. Learners focus on identifying the appropriate sense of the word and the appropriate pattern in the entry. After finding it, they transfer the pattern into the gap-fill, making changes as needed to tense, number, singular/plural, etc. Incorrect submissions are indicated via immediate feedback and hints are available if learners have trouble providing the right response.

Figure 12
Part-task Practice ([click to view sample online](#))

The screenshot shows a digital interface for a language exercise. On the left, a dictionary entry for 'perspective' is displayed, including its part of speech (noun), related topics (Visual, Painting and Drawing), and four numbered senses with example sentences. On the right, a sentence 'My wife looks at life from a very different perspective than I do.' is shown with gaps for the word 'perspective'. Below the sentence are 'Check' and 'Hint' buttons.

perspective noun

NEW! See related topics: VISUAL PAINTING AND DRAWING

per-spec-tive

1 [countable] a way of thinking about something, especially one which is influenced by the type of person you are or by your experiences (→ *viewpoint*)

perspective on

His father's death gave him a whole new perspective on life.

from somebody's perspective

The novel is written from a child's perspective.

from a feminist/Christian/global etc perspective

We have to look at everything from an international perspective.

a much-needed **historical perspective**

wider/broader perspective

Our work in Uganda and Romania adds a wider perspective.

2 [uncountable] a sensible way of judging and comparing situations so that you do not imagine that something is more serious than it really is:

I think Viv's lost all sense of perspective.

The figures have to be put into perspective.

get/keep something in perspective (=judge the importance of something correctly)

3 [uncountable] a method of drawing a picture that makes objects look solid and shows distance and depth, or the effect this method produces in a picture:

the artist's use of perspective

4 [countable] **formal** a view, especially one in which you can see a long way into the distance

Definition from the Longman Dictionary of Contemporary English
Advanced Learner's Dictionary.

My wife looks at life from a very different perspective than I do.

Check Hint

Note: This activity aims to develop skills at exploiting dictionary entries for word-pattern information, which is then applied to a specific context.

In addition to elaboration, induction is used to build the word-pattern schema. Figure 13 shows two ordered tasks from a longer sequence addressing the non-recurrent skill of identifying patterns in text. In the first, learners find instances of the abstracted patterns provided at the top of the exercise by clicking on the node (i.e., lexical) word of each pattern as they find it in the text. They are encouraged to use their browser's "Find" function to highlight non-lexical elements of the pattern (e.g., a preposition) to narrow the possibilities and reduce cognitive load. When they have identified the instantiation of each pattern, they move on to the second exercise, in which the node words are now highlighted and non-lexical elements of each pattern are missing. At this point, dictionary use is encouraged to help fill the gaps. An important feature of word patterns shown here is that they can structure surprisingly long stretches of text and span intervening words.

Figure 13
Tasks Employing Induction to Elaborate a Word-pattern Schema ([click to view sample online](#))

The Patterns of Words

vtcourse.com/mod/quizport/view.php?tab=preview&unumber=-1&quizid=1050&qnumber=-1&columnlistid=general&columnlisttype=quiz&se:

1. ADJ + *to*
2. N + *in* + -ing
3. N + *of*
4. V + n + *for* + n
5. V + n + *from* + -ing
6. V + n + *toward* + n

toward 1 of 2

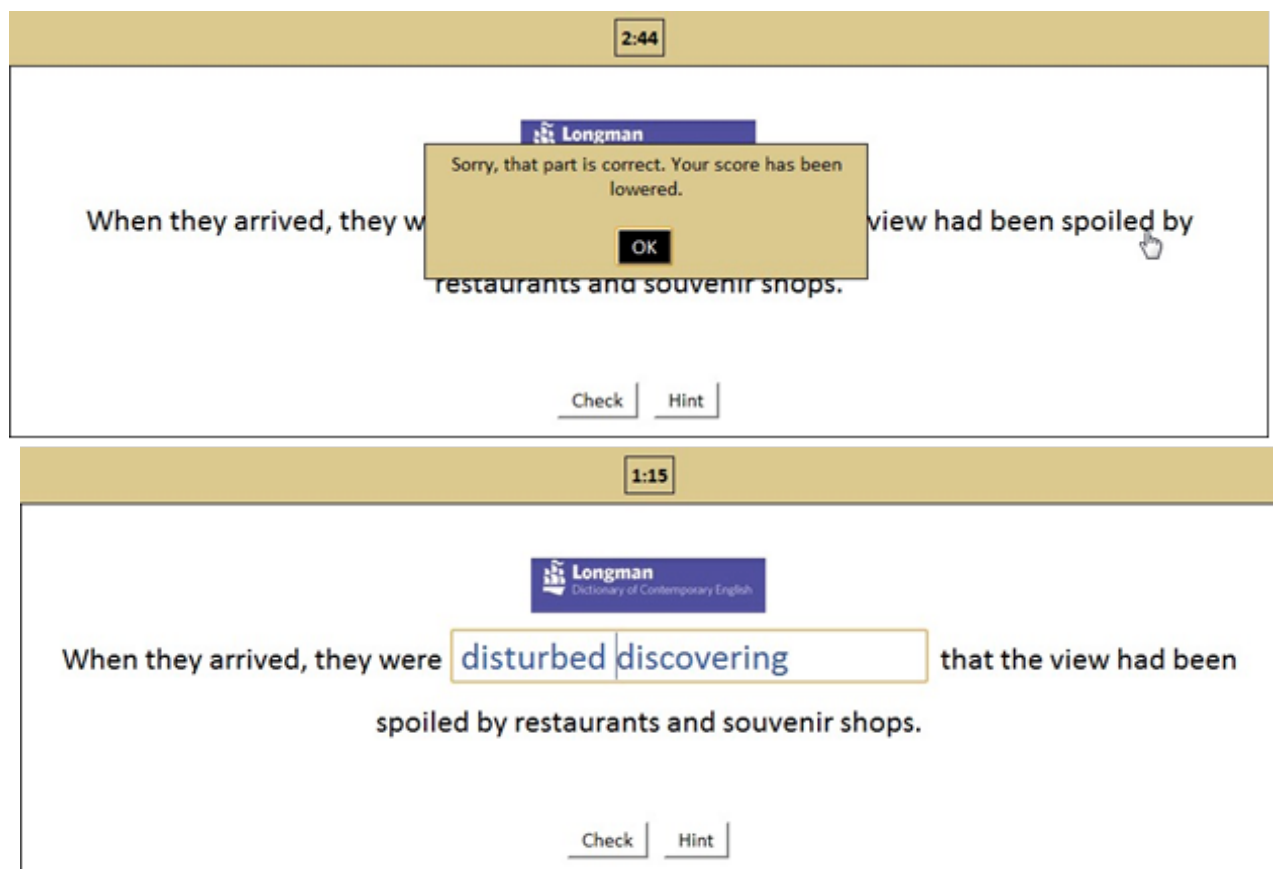
Another observation that is **(1) relevant** to this discussion is the finding that high school played a significant role in shaping the students' expectations for themselves. Specifically, high schools tended to **(6) guide** students from poorer backgrounds **toward** community colleges or local universities rather than more selective institutions, even when the students had academic records that would **(4) qualify** them for admission. In their study of the factors affecting community college transfer, Lee and Frank (1990) argued that, "Of all the factors studied, social disadvantages **(5) inhibit** community college students from transferring to four-year universities the most" (p. 191).

Another observation that is **relevant** this discussion is the finding that high school played a significant **role** shaping the students' expectations for themselves. Specifically, high schools tended to **guide** students from poorer backgrounds community colleges or local universities rather than more selective institutions, even when the students had academic records that would **qualify** them admission. In their **study** the factors affecting community college transfer, Lee and Frank (1990) argued that, "Of all the factors studied, social disadvantages **inhibit** community college students transferring to four-year universities the most" (p. 191).

Check Hint

Finally, the training culminates in whole-task practice, as shown in Figure 14. In each task, learners are provided with a sentence containing a word pattern error that is not highlighted. The sentences have been written to contain at least one distractor pattern in addition to the actual error. Learners must first identify the error by clicking on the node word in the pattern. Guessing is discouraged by significant reductions in points for clicking on any part of the sentence that is correct. Instead, learners must confirm their hypothesis in the dictionary, for which a link is provided. Clicking on the actual error makes that part of the sentence editable. Learners then choose the appropriate pattern from the dictionary and modify it to fit the context. Automatization and strengthening are supported by imposing a three-minute time limit for each item. The items are organized into three sets of 15, which are made available at 2-3 day intervals, in accordance with the principle of spaced (versus massed) practice (Baddeley, 1990; van Merriënboer, 1997).

Figure 14
Whole-task Practice ([click to view sample online](#))



Note: These activities bring together most of the constituent skills developed in the VVT course.

CONCLUSION

Since the completion of the prototype, the project has moved to the evaluation stage. At the time of writing, the VVT course has been tested in four different semesters with nearly 200 learners. An evaluation study found the course to be effective with the target group—as illustrated in this [before-and-after video](#)—and to be positively received by most students (Ranalli, forthcoming).

Assuming continued institutional support, the next focus will be curricular integration. To date, the materials have been used only as a parallel but discrete component of an ESL composition course at Iowa State University. This piloting has revealed scope for increasing

instructors' familiarity with pattern grammar. In conjunction with this, the project seeks their collaboration in helping learners integrate strategic pattern knowledge into their L2 writing. Teacher support is seen as crucial for transfer and maintenance of the gains achieved through the VVT course, which could be expanded to include other aspects of vocabulary learning, both depth-related (e.g., lexical collocation) and size-related (e.g., recording and reviewing strategies). Tutorials addressing these objectives are already in development.

In addition to describing the creation of a particular course, this paper has proposed principles for the design of online L2 strategy instruction, based on the concepts of cognitive load, complex cognitive skill, and multimedia learning. These principles could prove useful in addressing recently discussed needs to help learners make more strategic and self-directed use of CALL resources (Hauck, 2005; Hauck & Hampel, 2008; Winke & Goertler, 2008), particularly in contexts where processing demands are likely to be high.

Making the case for CALL learner training, Hubbard (2004) wrote:

We should not release our students into powerful learning environments unprepared: It is our responsibility ... to see that they are able to make informed decisions about how to use computer resources effectively to meet their learning objectives. (p. 51)

Without instructional support that includes the development of greater language awareness, resources such as online ELT dictionaries may be as likely to provide students with cognitive overload as they are learning opportunities. The instructional design approach outlined here can be used to identify and help manage the demands such tools make on learners' cognitive resources, while at the same time developing the provisional resource of their L2. In other words, it might help learners not only to navigate powerful learning environments more effectively, but to refine their learning objectives by means of increased understanding of what languages consist of and how they work.

NOTES

¹The linguistic phenomena addressed in this project are called by different names (e.g., *patterns*, *colligation*, *grammatical collocation*, *constructions*, *collostructions*) depending on the approach to linguistic description one adopts. Pattern grammar has been adopted here because the author has found the notion of 'pattern' to be instructive for ESL/EFL learners and because the system aligns well with pedagogical dictionary data.

²Patterns are distinguished from collocations here as follows: the former are characterized by the (frequent and nonrandom) co-occurrence of a lexical word with a function word, a word class, or a complementation structure; while the latter feature the co-occurrence of two or more lexical words. These categories are obviously not mutually exclusive.

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ACKNOWLEDGMENTS

My sincere thanks go to Carol Chapelle, my dissertation advisor, for her guidance and support; to Susan Hunston, for taking the time to provide feedback not only on an earlier draft of this paper but on the VVT materials themselves; to the anonymous reviewers, whose recommendations stimulated my thinking and helped improve the quality of this article; and to Gordon Bateson, the developer of QuizPort/TaskChain, whose programming skills and responsiveness made the whole project possible.

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